

The Effects of Blended Learning Model via Learning Environment on Cloud Computing to Enhance Creative Products of Undergraduate Students

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Abstract: *The purpose of this study were 1) to evaluate the creative products of learners after learning the blended learning model via learning environment on cloud computing called "BLEC Model", 2) to study the learning achievement of learners studying with instructional design, and 3) to study the satisfaction of learners learning with instruction designed. The samples were 33 undergraduate learners majoring in computer education, faculty of Education, Phranakhon Si Ayutthaya Rajabhat University who registered the graphic design by computer course in the first semester of 2017 academic year selected by simple random sampling. The research instruments were 1) learning plan of BLEC Model, 2) the creative thinking test, 3) learning achievement and 4) the questionnaire of satisfaction. The statistic that used in research were the mean, standard deviation, and t-test. The results showed that: 1) the evaluation of creative products after learning the instruction designed were found of a high quality, 2) the achievement of learners after learning with instruction designed was higher than before learning at the 0.05 level of significance, and 3) the learners were satisfied with the BLEC Model at the highest level.*

Keywords: *Blended Learning, Cloud Computing, Creative Products, Learning Environment*

1. Introduction

In recent century, learners should be taught in essential skills such as critical thinking, problem solving, creativity, effective communication and collaborating with co-workers [1]. Resulting in developed instruction generates a new principle of learning for students especially the education in the 21st century which required different challenges. Many institutions are embracing the new technologies into their system. Thus, these technologies must be suitable to the essential skills. Interestingly, students have learnt pre-skills or fundamental abilities of the technologies from schools, and capable to build up and study new skills during undergraduate period. Therefore, technologies for designing the instruction are strongly recommended as an infrastructure facility [2].

Technology is everywhere in education: Public schools in the United States now provide at least one computer for every five students [3]. Schools and Educators use technology primarily as a tool for developing students' computer and Internet skills because technology can be a means to access content on any topic, a tool for thinking and creating, a connection to peers and experts. Educators can use technology in the classroom in many different ways. In recent years the terms like e-learning or online learning have occurred as a result of the integration of new technologies in education. E-learning, or online learning is continuing to grow and it has increased the demand for distance education [4]. Many higher education institutions today have multiple modes such as on-campus, at a distance, online or a blended learning for teaching [5],[6]. Blended Learning is one of the learning methods that stems from the accelerating pace of the current era technology. The combination of

technology and teaching methods have created a learning method identified as blended learning [7], students can access to learning materials by using web technologies outside the class while attending face-to-face education.

One of the newest technologies for online learning is cloud computing that has garnered a considerable amount of attention. In particular, students and teachers to use applications without installing them on their computers and also allows access to saved files from any computer with an Internet connection. [8] In addition, it is very easy to share content created with these tools, both in terms of collaborating on its creation and distributing the completed work.

Jonassen [9] suggested that constructivism should be applied to distance education and proposed a constructivist design model for online learning enhances learners to interact with knowledge and each other using various tools and emphasizes on the learning environment where learning occurs rather than instruction itself [10]. In constructivist learning environments, where the emphasis is on collaboration, relationships, inquiry, and invention, overreliance on traditional tests that emphasize factual recall is not consistent with the nature of the learning that takes place in these environments [11]. When students have high self-efficacy and feel that they will be successful in tasks, they become more motivated to reach the goals.

This article describes an existing the effects of blended learning model via learning environment on cloud computing to support meaningful learning outcomes. The core of the discussion, however, is on uncovering the transformative potential of blended learning via learning environment on cloud computing approaches in higher education and enhancing their creative products.

2. Literature Review

2.1. Blended Learning

Blended learning is a mixing teaching method likes event-based activities, face-to-face classrooms attentions, e-learning, and self-study learning. Normally, blended learning is defined as any combination of learning delivery methods that includes face-to-face instruction with asynchronous and/or synchronous computer technologies [12], [13]. An importance of interactive and complicated learning experience is an understanding of internet and communication technologies to connect learners. The interesting in blended learning can also be attributed to the advances and dilatation of communications technology in segment of society advances that have not seen the same degree of uptake in the higher education classroom.

Nowadays, students are currently enrolled in higher educational programs [14]. Basically, blended learning is the thoughtful integration method in classrooms, which are face-to-face learning experiences and online learning experiences. Based on the internet properties, it has been proved that blended learning is successfully in enhancing interactions and capabilities of the internet communication technology [15]. Students are heavily engaged in social media (i.e., blogs, twitter, podcasts, wikis, social network sites, virtual worlds, video sharing and photo sharing), the internet plays an increasingly important role in their social and academic life [16]. When new technological developments are considered, it is clearly seen that blended learning increases the quality of education. Blended learning is not, however, a key to success in education. Students must be attended other learning approaches. Therefore, it is important to choose the appropriate learning environment for online learning for students.

2.2. Learning Environment

Constructivism theory focuses on the learner's experiences of the real world, prior knowledge, mental structures and beliefs, emphasize knowledge construction, and meaningful context [17]. The constructivist approach has taken a leading theoretical position and has become a powerful driving force in the dynamic relationship between teaching methods and learning processes [18]. Therefore, the constructivist learning environment enhances learners to interact with knowledge and each other using various tools and emphasizes on the learning environment where learning occurs rather than instruction itself [10]. In order to determine students' perceptions in their classroom environment, the Constructivist Learning Environment Survey (CLES) is

considered to be an ideal instrument to administer in the current study because of measuring the critical dimensions of constructivist learning environment. The learning environment can be classified as personal relevance in their studies, shared control over their learning, feel free to express concerns about their learning, interaction with each other to improve their learning, and sharing any scientific knowledge [19].

2.3. Cloud Computing

Cloud computing is a model for enabling ubiquitous and convenient network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction [20]. Cloud computing is a computing technology that uses the internet and central remote servers to maintain data and applications. This technology allows students and teachers to use applications without installing them on their computers and also allows access to saved files from any computer with internet connections [21]. Moreover, cloud computing are excellent alternative educational institutions which do not require any budget [22]. Additionally, services are used daily by learners and educators to support learning, social interaction, content creation, publishing and collaboration. Examples of cloud-based services include Google Apps, YouTube, Twitter, and Dropbox.

2.4. Creative Products

Educational outputs from previous learning methods are considered in term of creativities and designs. Here, the outputs are broadly defined such as poems, dances, essays, foods, computer programs, or machine tools [23]. The designs are recognized substantive differences according to a topic that is given from the instruction. However, the design must be examined as novel results, utility, and value [24]. The Creative Product Semantic Scale (CPSS) is adapted from a theoretical model which is composed of three factors: Novelty, Resolution, and Elaboration and Synthesis [25]. This CPSS was selected as a tool to evaluated learning outputs from undergraduate students. Any explicit designs and products were accepted to access to this study.

3. Research Methodology

3.1. Purposes of this Study

The purposes of this study were;

- 1) To evaluate the creative products of learners after learning the BLEC model.
- 2) To study the learning achievement of learners studying with the BLEC model.
- 3) To study the satisfaction of learners learning with the BLEC model.

3.2. Participants

Undergraduate students (n = 33) were joined this experiment. These students are registered the graphic design by computer course in the first semester of 2017 academic year, Department of Computer Education, Faculty of Education, Phranakhon Si Ayutthaya Rajabhat University, Thailand. All of the students were learned by BLEC model for five weeks, BLEC model was then used to investigate the effective results.

3.3. The BLEC model

The BLEC model was previously published in 2017 [26]. This model was consisted of three components as follows: 1) Preparation, 2) Learning Process, and 3) Summary and Evaluation as shown in Fig. 1.

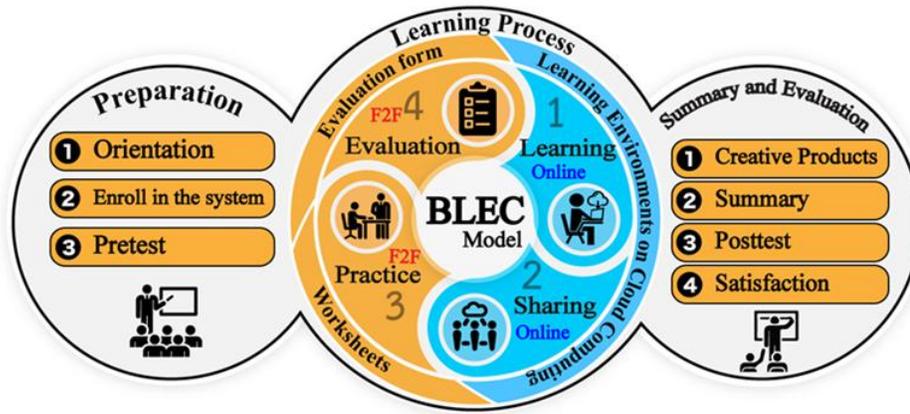


Fig. 1. The Blended Learning Model via Learning Environment on Cloud Computing (BLEC Model) [26]

1) **Preparation is a basic concept of instructor for preparing learners. Grouping, activities (face-to-face), and others descriptions of the class are announced to students as follows:**

1.1) Orientation happens on the first days of the meeting. This class explains learners about details of the course, timetable, evaluation which is mentioned about how to learn in the online and offline. Moreover, this time would be used to create a positive attitude between the instructor and the learner in the group.

1.2) Enrolling into the system is introduced such as how to access the network and a trial in the system which is prepared by instructor.

1.3) Pretest is used to evaluate students before starting the class. The test is multiple choice questions using the Cloud Collaboration test: Google Form.

2) **Learning process is a Blended learning in the classroom and online learning environments as follows:**

2.1) Learning Step: the learners study the theoretical content and practice via multimedia videos by self-learning through the learning environment in the elements of Resources on Cloud Learning: Google Classroom and Edpuzzle.

2.2) Sharing Step: when the learners pass the theoretical contents and practice by videos. The instructor offers problems or interested topic to the learners through the learning environment on Cloud Learning. In order to pass this step, the learners support to find any ideas for solving the problems or developing their works. A management of document files and others happen on Cloud Collaboration: Google Drive. In addition, the instructor has provided related cases to support learning as a guideline for the learners to interact with the classmate's experiences. This step also helps students who face with the problem through Cloud Communication: Google Hangout on solutions based on problem situations.

2.3) Practice Step: It's a step back in the classroom to practice following a worksheet. The worksheet is consisted of the explanation and the sequence of steps according to the problem situations that learners have learned by themselves from the previous self-learning. At this moment, the instructor observes the behavior, gives an advice, and stimulates the learners to adjust unique ideas for the final products.

2.4) Evaluation Step: The instructor uses a qualitative rubrics evaluation form. The learners are be evaluated by the instructor and class participants including reflection and exchange ideas of their performance in order to improve themselves for future learning process and the final products.

3) **Summary and Evaluation is the last component of learning as follows:**

3.1) Products is a result of the actual assessment according to the five-level rubrics for quality assessment by the instructor and class participants.

3.2) Summary is used to interpret the output between learners and instructor by discussing the knowledge gained from self-study through the online learning, sharing the results of the practice how to develop creative products and problems occurring during the activity such as providing feedback.

3.3) Posttest is used to determine the learners after pass the class with multiple choice questions using the Cloud Collaboration test: Google Form.

3.4) Satisfaction is an assessment to measure the level of learners' satisfaction with the BLEC model using the five quality rating scales in Cloud Collaboration test: Google Form.

Herein, this BLEC model was certificated by expert educational counselors for the suitability of its components, instructional process, and utilization. The results found that their agreed these 3 components of BLEC model were the highest quality of suitability [26].

3.4. Measuring Tool

This study developed the evaluation form of creative product by the concept and theory of the creative product semantic scale (CPSS) had actual conditions assessment with multiple rating scales using five-level rubrics, consisted of 3 factors and 10 questions [25], [27] as shown in Table 1

TABLE I: Scoring Criteria For Measuring Creative Products

Factors	Scoring criteria
1. Novelty	
1.1 Originality	It is the result of a new concept have the idea of creating a unique work is not the same as the general works. Unlike the works of others that have before.
1.2 Germinal	the product consistent with their problems. Influence on problem solving can be used to solve this same problem in the future.
1.3 Design	The draft was designed by Design Brief and Mood Board Diagram, easy to understand and consistent the problem, and unique
2. Resolution	
2.1 Development	It is the product of the process that is designed, developed a systematic manner possible. Can be clarified each process completely clear.
2.2 Knowledge	It is a product that shows the knowledge consists of 1) Using a computer program skills, 2) Color theory, and 3) Graphics selection appropriate for the topic.
2.3 Organic	It is a product that positioned the elements of the object or component, as appropriate
3. Elaboration and Synthesis	
3.1 Elegant	Developed with meticulous attention to detail, expertise to produce, and attractiveness to the others.
3.2 Understandable	It is the product that spectator or user can easily to understand and clear.
3.3 Valuable	It is important to the people who see it. Both physical, psychological and life, have benefits for deployed.
3.4 Useful	It is a quality product can be used to meet the real problem immediately.

Furthermore, the content validity by synthesis from theory and content matching was accepted by five creative professionals and the reliability of the evaluation was .84 at high reliability [28].

4. Research Results

The learners learned in the BLEC model, the results were shown as follows.

4.1. Creative Products

The participants of the experiment were randomly grouped into eight groups to create a product with a unique different problem through the process of learning in the BLEC model. After that, actual assessment was used according to the five-level rubrics for quality assessment by the instructor and class participants. The result is shown table 2.

TABLE II: The Evaluation of Creative Products

Dimension	\bar{x}	S.D.	Level of meanings
1. Novelty	4.38	0.59	High
1.1 Originality	4.47	0.53	High
1.2 Germinal	4.47	0.53	High
1.3 Design	4.20	0.67	High
2. Resolution	4.33	0.63	High
2.1 Development	4.52	0.59	Highest
2.2 Knowledge	4.23	0.64	High
2.3 Organic	4.23	0.64	High
3. Elaboration and Synthesis	4.39	0.56	High
3.1 Elegant	4.31	0.50	High
3.2 Understandable	4.33	0.56	High
3.3 Valuable	4.42	0.59	High
3.4 Useful	4.52	0.56	Highest
Summary	4.37	0.59	High

Table 2, results showed that overall products of learners that learned with BLEC model was classified as the high score at $\bar{x} = 4.37$, S.D. = 0.59. This finding implied that the BLEC model provided a positive influence over successful in creative products of learners.

4.2. Achievement of Learners

The results of dependent t-test for learners, which was carried out to check the significance of the difference in the mean scores obtained from both pre-test and post-test as shown in table 3.

TABLE III: The Achievement of Learners

Measurement	n	\bar{x}	S.D.	df	t-test	Sig.(1-tailed)
Pre-test	33	9.48	2.68	32	19.40	.000
Post-test	33	15.85	2.27			

This examination of form table 3 indicated that pre-test and post-test scores of the experimental group instructed through the BLEC model were significantly difference ($t(32) = 19.40$, $p < 0.05$). Based on this observation, it was possible to conclude that the BLEC model had a positive effect on for the learners.

4.3. Satisfaction of Learners

After the learners had learned the BLEC model, they were required to evaluate their satisfaction with the instruction designed using the five quality rating scales as shown in table 4.

TABLE IV: The Satisfaction of Learners

Dimension	\bar{x}	S.D.	Level of meanings
1. The blended learning	4.60	0.59	Highest
1.1 The appropriate of online learning management	4.73	0.45	Highest
1.2 The appropriate of face-to-face management	4.58	0.50	Highest
1.3 Learning environment by instructor	4.48	0.76	High
2. The learning environment on cloud computing	4.54	0.53	Highest
2.1 the appropriate of component	4.52	0.51	Highest
2.2 encourage learners to create creative products	4.55	0.51	Highest
2.3 solve problems as they occur	4.45	0.62	High
2.4 encourage learners to use a variety of technologies in their activities	4.64	0.49	Highest
3. The benefits that learners receive	4.65	0.48	Highest
3.1 benefit from teaching and learning	4.64	0.49	Highest
3.2 contributions can be developed creatively	4.52	0.51	Highest
3.3 should be teaching this course to others	4.76	0.44	Highest
3.4 can be guideline for developing other learning	4.70	0.47	Highest
Summary	4.60	0.53	Highest

According to the table 4, the satisfaction of learners after learning with the BLEC model found that the learners satisfied with the designed instruction at the highest level ($\bar{x} = 4.60$, S.D. = 0.53) the most satisfied topic was “should be teaching this course to others” which was 4.76 of mean and 0.44 of standard deviation.

5. Discussion and Conclusions

Research results have pointed that the BLEC model have a positive influence over learners' success to create products because blended learning gives learners and teachers a potential environment to learn and teach more effectively [29]. Both traditional teaching in the classroom and ICT supported learning both offline learning and online learning. The blended learning, regardless its implementation design, showed a considerable positive effect on the teaching and learning process [30]. Furthermore, the blended learning improved students' achievements through cognitive activities [31]. This research adopted the concepts and principles of Constructivist Learning Environment (CLE) to engage the learners in relevant and meaningful knowledge constructions, advanced knowledge acquisitions [32]. Moreover, it also applied technology on Cloud Computing as an exciting development which is an alternative educational perception [22]. In addition, Cloud Computing was able to enhance effective facilitated students, reflection abilities and enhance their learning motivations [33]. Besides, there was affords opportunities for the greater student choice in learning such as free and on demand e-communication services which are available at anytime from anywhere, smaller operational expense, less infrastructure cost such as power, heating and cooling costs [34]. Educators need to embrace this trend in technology as they develop students' talents and expand their students' understanding of a world that lies in wait at their fingertips [21]. Furthermore, considering the efficacy of the present study suggested that similar studies may be conducted for other topics and branches, and this method can be an effective way in term of improving academic success. Therefore, this finding indicated that the learners with learning process that focused on practical skills using blended learning and learning environment on cloud computing appropriately affected to the creative thinking process to develop their product.

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